

## **Visibility, Size and Growth Opportunities as Determinants of Equity-Based Compensation**

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### **Abstract**

The purpose of this paper is to increase the understanding for the use of long-term equity-based executive compensation primarily defined as stock option grants. We use data for 204 Swedish stock listed companies and apply a set of explanatory variables based on previous international research. We find statistical support for the hypotheses that firm size, growth prospects and CEO age determine the fraction of long-term equity-based remuneration in the total compensation. On the other hand, we do not obtain consistent evidence for similar hypotheses with respect to CEO firm ownership, visibility and cash. The main conclusion drawn on the basis of our study is that the variables we tested may in fact give some indication with regard to the structure of the CEO compensation, namely, the probability that the company chooses to compensate its CEO with long-term equity-based remuneration rather than with short-term cash payments such as fixed salary or bonuses. However, further research is required to make more long-going conclusions with respect to the relative weight of every factor in determining the structure of the executive compensation.

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# 1. Introduction

The value of equity-based compensation programs administered for senior management by Swedish stock listed companies in 2007 have been estimated to reach approximately SEK100 billion, which is twice as much as in 2003. Approximately 60 percent of listed companies in Sweden used stock options as a form of equity-based compensation in the year 2007 (SVT, 2007). Increasing volumes of option programs as well as recent media focus on the soaring levels of senior management remuneration have stimulated a growing research interest in the subject of CEO compensation and its relation to enterprise performance and diverse company characteristics (Jensen and Murphy, 1990), Murphy, 1999, Himmelberg and Hubbard 2000, Gabaix and Landier, 2006). Some of these studies focus specifically on the political, economic, and behavioral factors that might have contributed to the boom of stock option grants (Murphy, 1999), while others examine the determinants of stock-option compensation such as CEO age, firm growth opportunities and size (Harvey and Shrieves, 2000, Bryan, Nash and Patel, 2006, Rayton, Brammer and Cheng, 2007).

While the most common focus is primarily on the determinants of CEO's total remuneration level, few studies have been published where the issue of compensation structure rather than level is being discussed. Among those studies is a paper by Giannetti (2007) who looks at the relationship between managerial reputation and long-term compensation contracts arguing that increased CEO visibility causes short-terministic agency problems that can be mitigated by introducing long-term incentives in the form of equity-based compensation.

Building further on the arguments set forward by Giannetti (2007) the main objective of this paper is to analyze the determinants of stock-option<sup>1</sup> compensation based on the data collected for Swedish companies listed at the Nordic Stock Exchange (OMX) for the period from 2000 through 2006. The core of our analysis is the structure<sup>2</sup> rather than the level of CEO compensation. With our study we hope to contribute to a better understanding of why some firms use equity-based compensation and what specific firm and CEO characteristics determine the relative share of stock-option compensation in the total remuneration package.

As a result of this research we conclude that the fraction of equity-based compensation is positively related to firm growth prospects, size, and negatively related to the CEO's current

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<sup>1</sup> As long-term compensation in the dataset is exclusively represented by stock-option grants we use "stock-option", "long-term" and "equity-based" to refer to the same phenomenon

<sup>2</sup> By structure we mean a relative share of stock option compensation in the total compensation package consisting of fixed compensation, bonuses, perks, share grants and stock options.

ownership in the company and her age. No conclusive results have been obtained with regards to the relationship between firm visibility and long-term compensation.

The thesis is divided into nine sections including introduction. Section 2 discusses previous research, while the subsequent four sections deal with our research approach, methodology and the choice of variables. In Section 7 the results from statistical analysis are presented and discussed, while the concluding section contains a summary of those results as well as suggestions for further research.

## **2. Previous Research and Theory**

In line with a common approach used in the compensation research (Matolsky and Wright, 2006), our point of reference is the principal-agent model in the framework of the contracting theory. According to this model managerial actions are unobservable which creates preconditions for adverse outcomes such as underinvestment, overinvestment, excessive consumption of perks, etc. Hence, there is a need for an incentive plan designed to minimize agency costs and induce the manager to act in the interests of shareholders by aligning her interests with those of firm's shareholders (Jensen and Meckling, 1976). In an attempt to align at times diverging interests, monitoring costs are incurred associated with overseeing the manager's behavior (e.g., mandatory audit costs). However, when an efficient compensation contract is set up, the agency costs can be transferred from the principal to the agent. Examples of mechanisms through which compensation policy can provide value-increasing incentives include performance-based bonuses and salary revisions along with stock options and performance-based dismissal decisions (Jensen and Murphy, 1990). Short-term performance-based payment is often represented by cash bonuses dependent on short-term firm performance while long-term performance-based payment includes stock or option based compensation which by definition depends on the long-term firm performance (Giannetti, 2007).

## ***2.1 Dependence of Pay on Company Performance and Visibility***

Gabaix and Landier (2006) argue that increased CEO compensation in the U.S over the past 20 years can be directly attributed to the growth in size and value of American companies suggesting that as the company grows it is willing to pay more in order to retain the top talent. Hence, expansion in outside employment opportunities directly related to the increased overall competition for top managerial talent drives the pay up. It follows that if executives' outside options determine the level of compensation, then the relationship between firm performance and executive pay may not follow a linear pattern and, taking this logic even further, executive pay can be perceived as excessive or non-justified when company performance is taken into consideration. Gabaix and Landier argue that since the number and size of U.S-based and American firms exceeds the corresponding figure for its European and Asian counterparts, this situation results in higher competition for top talent among the American firms and explains the inflated level of CEO remuneration in the U.S.

For additional evidence in support of this logic one can also refer to the study conducted by Murphy (1999) who finds that the relative performance evaluation (RPE) plays only a limited role in determining executive pay<sup>3</sup>. Executive compensation was found to be more related to the aggregated market returns rather than to the industry returns. Similarly, Himmelberg and Hubbard (2000), and Rajgopal, Shevlin and Zamora (2005) discuss that fact that firms do not filter out market- or industry-wide returns from the executive compensation packages and tend to reward CEOs for systematic risk or aggregated market returns that do not depend on CEO's effort or managerial talent. This award structure may in fact be optimal if managers' reservation wage<sup>4</sup> depends on the outside employment opportunities<sup>5</sup> and varies with the economic cycle. In other words, given the scarcity of CEO talent, the demand for CEOs increases as the economy booms and firms must offer larger compensation packages in order to retain their talented executives. Large companies are assumed to require a greater number of talented executives with greater outside employment options and larger compensation demands. Empirical testing of this hypothesis has been hampered by the absence of readily available proxies for CEO talent.

Other studies have focused on the pay-performance evaluation of CEO compensation packages, measuring the sensitivity of compensation level to firm performance. Jensen and Murphy (1990)

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<sup>3</sup> RPE rewards the executive based on the relative performance in comparison to the firm's competitors within the same industry.

<sup>4</sup> If an agent rejects all jobs paying under a certain pay level and accepts all jobs paying above a certain pay level, that pay level can be defined a reservation wage.

<sup>5</sup> The writers argue that CEO's outside employment opportunities depend on CEO talent as measured by visibility in the financial press and his firm's industry-adjusted return on assets (ROA).

test the implicit regulation hypothesis assuming that firms that are more visible to regulators and politicians tend to be more closely scrutinized and thus reduce compensation during the times of good firm performance causing a weaker pay-firm performance relation. Visibility in this study was defined only in terms of market capitalization. Another study using the number of news stories as a proxy for visibility and testing for the same relationship produced similar results (Rayton, Brammer and Cheng, 2007).

Hartzell and Starks (2003) suggest another explanation for why the pay-performance relationship may not hold. The authors argue that a larger fraction of performance-based pay in the compensation package implies higher risk for a CEO who would compensate for risk by demanding a pay exceeding the optimal level.

## ***2.2 Compensation Structure and Outside Employment Options***

Frydman (2005) makes another interesting contribution to the discussion of long-run trends in executive pay and mobility. She argues that a shift from firm-specific to general managerial skills has taken place and she suggests that the outside options of CEOs have increased as a result of this shift, since managerial skills are no longer tied to a specific company. The underlying factors explaining the shift include improvements in information and communication technology, in modern finance and strategic analysis, as well as an increasing industrial and geographic diversification of firms during the 1960s and 1970s which further contributed to the increased scope, scale, and complexity of firms adding value to general managerial abilities. The author finds a positive correlation between top executive compensation and the generality of managerial skills exhibited by those top executives, arguing that managers who hold more general skills have greater opportunities to swap companies and therefore possess more bargaining power while negotiating their contracts.

Another contribution to the discussion of a CEO compensation structure has been made by Giannetti (2007) who looks at the relationship between CEO's outside employment options and reward structure. The author argues that in the presence of outside employment opportunities CEOs can be expected to have a preference for boosting company returns in the short run in order to build up their reputational capital positively related to their marketability and consequently to a higher pay level at the next job. Therefore, in order to redirect CEO preferences towards a strategy that would benefit long-term company performance, a long-term compensation package should be introduced. It is also suggested that as growth prospects within the company increase, the propensity towards offering a higher share of long-term incentives in

the total compensation can be expected to increase reflecting more urgent attempts to align CEO interests with those of shareholders. In addition, given unchanged growth opportunities, a higher share of long-term compensation in the total compensation is to be expected when outside employment opportunities increase as a result of better company visibility.

### ***2.3 Other Determinants of Compensation Structure***

Among studies focusing on CEO compensation structure, it is worth mentioning Matolscy and Wright (2006) along with Bryan, Nash and Patel (2007) who discuss the effect of equity-based compensation on CEO payment structure and provide evidence that the strength of shareholder rights and quality of law enforcement can to certain extent explain the usage of equity-based compensation. These authors also find that larger firms use more equity in their compensation packages. This finding is in line with Jensen and Meckling's (1976) model where a higher level of equity-based compensation is necessary to align managerial interests with those of the shareholders when the firm grows and monitoring costs increase.

Bebchuk and Grinstein (2005) also draw attention to the increase in stock market capitalization over the last two decades as the explanation for growth in executive pay. They produce evidence showing that the increase in overall pay is related to a more wide-spread use of option-based compensation.

Harvey and Shrieves (2000) include CEO characteristics in the study of compensation structure determinants. They argue that older CEOs have a limited personal investment horizon and as a result may resist additional equity exposure in their portfolios. Given regularly imposed restrictions on the liquidation of these investments such resistance becomes even more pronounced.

Jensen (1986) argues that larger amounts of excess cash lead to more severe agency problems as discretionary cash can be misinvested or lost through organizational inefficiencies. A stronger alignment of managerial and shareholder interests may help to mitigate this "free cash flow problem" explaining why firms with greater free cash flows can be expected to offer a larger equity-based component in the total compensation. However, in a paper by Bryan et al. (2000) a negative relation between cash flows and equity compensation was identified with a suggested explanation that firms with low cash flows may rely more heavily on stock option awards to conserve cash.

### 3. Hypotheses and Assumptions

The main objective of this paper is to investigate explanatory factors behind the use of long-term equity-based compensation among 204 Swedish companies listed at OMX for the period from 2000 through 2006. Our dependent variable is equity-based compensation as a fraction of total compensation package. Nominal value of equity-based compensation is derived as a sum of long-term share grants and stock-option grants per year. As share grants have been used only by 6 companies in the dataset, stock-option compensation defines the equity-based/long-term compensation in further analysis.

#### ***Hypothesis 1***

*The fraction of long-term equity-based compensation in the total compensation package is positively correlated with firm visibility.*

Referring to the framework developed by Giannetti (2007) and described in the previous chapter, the increase in the scope of outside employment opportunities should be positively correlated with the increase in the fraction of equity-based compensation in the total compensation. At the same time, increase in outside options is a function of a firm's visibility, since it is reasonable to expect that CEOs from more visible companies enjoy a higher probability of receiving alternative job offers. Hence, we expect a firm's visibility to be correlated with the use of stock option payment. In our study, we have chosen the number of news articles published at Bloomberg as the main proxy for visibility. Another proxy for visibility that we use with regards to the large-cap companies is international stock listings.

#### ***Hypothesis 2***

*Larger firms are more likely to use a higher fraction of equity-based payment than smaller firms in the total compensation contract.*

This hypothesis draws on the theoretical discussion presented in the previous section and concerned with the rising monitoring costs as the company grows in size and scope. Higher fraction of equity-based compensation is expected to align managerial and shareholder interests and offset the propensity to focus on short-term returns and engage in opportunistic behaviour. As a proxy for size we use the previous-year market capitalization.



### ***Hypothesis 3***

*Firms with higher growth prospects use a higher fraction of equity-based compensation as opposed to firms with weaker growth potential.*

In line with the theoretical model by Giannetti (2007), higher growth prospects call for a higher fraction of long-term compensation to induce long-term orientation in a CEO's strategic choices and prevent excessive use of bonuses and perks. Our proxy for growth is the market-to-book ratio.

### ***Hypothesis 4***

*There is a negative relationship between the CEO's age and the fraction of equity-based compensation in his total compensation package.*

The underlying assumption discussed in the theoretical part of the paper is that older CEOs have a shorter employment horizon and cannot fully realize the benefits from the upside potential in stock options and share grants. In addition, older executives may have a more defined preference for a higher fraction of pension benefits instead of equity-based compensation as they approach the retirement date.

### ***Hypothesis 5***

*Firms with lower cash flows are expected to use a higher fraction of equity-based compensation in the total compensation as opposed to firms with larger cash flows*

Based on the research findings discussed in the previous chapter, we assume that firms with lower cash flows have a preference towards using a higher fraction of equity-based long-term rewards in a total compensation in order to conserve cash as opposed to the firms with higher cash flows that have less liquidity constraints with respect to paying out bonuses or higher fixed salaries.

## ***Hypothesis 6***

*Equity-based compensation as part of the overall compensation package is a decreasing function of CEO company ownership<sup>6</sup>.*

We assume that the larger is the CEO holding in the company the less she will be willing to accept equity-based rewards going forward. Increases in the equity-based compensation are positively correlated with the growth in risk for the compensation package as a whole. Assuming that the CEO is risk-averse and prefers a diversified portfolio, she would be unwilling to increase her exposure to unsystematic risk beyond a certain limit. Additionally, there are formal restrictions on the amount of shares that can be held by the senior management.

## ***Hypothesis 7***

*The odds of introducing equity-based compensation as a part of CEO compensation package are positively related to size, growth, and firm visibility, while negatively related to age, cash flow and CEO ownership in the company*

The reasoning behind this hypothesis is related to all the individual hypotheses presented above, but instead of addressing the relative size of equity-based compensation, we examine a simple dichotomy of when equity-based compensation is either used or not used by the company.

## **4. Data**

Our dataset includes 204 Swedish firms listed at OMX and is collected from three different sources covering the period from 2000 through 2006. Most of the compensation data has been hand collected using annual and quarterly statements published on company websites. To test our hypotheses presented in the previous section we match the CEO compensation data with the data on firm and CEO characteristics. In order to calculate the percentage of equity-based compensation in the total remuneration package, we first calculate the nominal value of stock option grants using the Black and Scholes model (see Appendix 5). Restricted stock grants have been valued using the reference price if available, otherwise we use the market price at year-end

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<sup>6</sup> CEO ownership is defined as a percentage of total company equity owned by the CEO.

of the period. We have excluded firms using warrants or convertibles<sup>7</sup> due to lack of data required for valuing these instruments.

As a second step we construct the ratio of long-term equity-based compensation by dividing the nominal value of stock option compensation in a given year by the sum of all compensation components, such as fixed salary, bonuses, etc.

To measure performance and company characteristics we merge data from SIXTRUST with the data provided in the annual and quarterly reports. We define size as a natural logarithm of previous-year market capitalization and market-to-book ratio as market value of equity divided by the book value of equity.

With regards to the quality and reliability of the collected data, it should be noted that possible biases may arise from the use of annual reports data with varying accounting practices. A time series analysis would have required corrections for the switch to IFRS-standards in 2004. However, we consider it as a less severe problem due to a cross-sectional approach. Potential disclosure problems may also have caused some minor biases in our dataset.

## **5. Description of Variables**

### ***5.1 Dependent Variable***

#### ***5.1.2 LONGCOMP\_YLY***

Long-term compensation is defined as a fraction of equity-based compensation in the total CEO compensation package. Equity-based portion includes the value of stock-options and share grants while remaining compensation components consist of fixed cash salary, variable bonus payments and perquisites. The definition we use is identical to the one used by Bryan, Nash and Patel (2006). We exclude pension benefits due to the complexities associated with the value of pension obligations. The value of option grants for each year has been estimated in applying the Black and Scholes option valuation methodology. Share grants have been valued using a

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<sup>7</sup> The value of convertible consists of an underlying option value and a bond value. The holder is given an option to convert a security into a pre-specified number of shares at a strike price approximately equals the bond value of the convertible. The face value of the bond normally equals the issue price of the convertible.

reference value from company reports if available, otherwise the market value of shares granted have been applied<sup>8</sup>. The applied formula is:

$$\frac{\text{Value of equity-based compensation}}{(\text{Fixed salary} + \text{variable bonus} + \text{perquisites} + \text{value of equity-based payment})}$$

## ***5.2 Independent Variables***

### ***5.2.1 OWN***

Executive ownership is defined as the percentage of the total number of outstanding shares owned by the company executive at year-end. The data on total outstanding number of shares has been merged using the SIXTRUST database, while the data on the nominal number of shares owed by the company CEO has been hand collected from the company reports. The applied formula is:

$$\frac{\text{Number of shares owned by a CEO at year-end}}{\text{Total number of shares outstanding at year-end}}$$

### ***5.2.2 SIZE\_MCAP***

This variable is defined as the market capitalization at the end of the year previous to the current year. In line with the commonly accepted practices, the variable is transformed by using the natural logarithm of the nominal value of market capitalization value. The data has been collected from SIXTRUST.

### ***5.2.3 GROWTH***

The rationale behind the use of this variable is based on the model suggested by Giannetti (2007) and discussed in the previous section. Briefly, a company with high growth prospects has larger incentives to reward its CEO with long-term compensation in order to make her choose a long-term over a short-term strategy. The proxy used by us to capture the growth effect

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<sup>8</sup> A common measure in estimating share grant values is applying option valuation with a zero strike-price (see Murphy, 1999). However, the fact that we use the same measure for all firms and that we have relatively few observations involving share grants, no considerable biases should be expected.

is market-to-book ratio defined as the market value of equity divided by the book value of equity. The data has been collected using SIXTRUST. The formula used:

$$\frac{\text{Market value at year-end}}{\text{Book value at year-end}}$$

#### **5.2.4 NEWS**

The number of news articles is used as a main proxy for firm visibility in line with the methodology suggested by Rayton, Brammer and Cheng (2007) and Baker, Nofsinger and Weaver (1998). The data has been hand collected using a search function at a Bloomberg terminal, conventionally accepted by investment professionals as a reliable source of market and company data. The data entry is a nominal number of news articles per year which contain references to a respective company name.

#### **5.2.5 LIST**

The variable is used as another proxy for firm visibility exclusively for large-cap companies and the data entry is represented by a one-digit number representing a number of stock exchanges where the company shares are listed. The variable is used only in the restricted dataset comprising observations for large-cap companies. The data has been hand collected using company websites and annual reports.

#### **5.2.6 CF\_MV**

The cash flow proxy is defined as the firms' excess cash after investments and dividends paid.

Pre-tax profit

+ Depreciation

+ Write-offs

-/+ Gains/losses on asset sale

- Investments

- Paid taxes

- Dividends paid

= Cash flow

The data has been obtained from the SIXTRUST database and each data entry represents the nominal value of company's cash flow at the end of the year previous to the current year.

### **5.2.7 AGE**

The variable represents the age of a CEO for each company in the dataset. The data on this variable has been collected using information in the annual reports.

### **5.2.8 GROWTH\_NEWS and GROWTH\_LIST**

These variables capture the interaction between growth prospects and visibility. The variables are used in our alternative test model where we check for the presence of interaction effects (Appendix 4).

## **6. Methodology**

The objective of this paper is to contribute to the understanding of the relationship between different firm and CEO characteristics and the use of equity-based compensation. In order to achieve this goal we rely on the quantitative analysis conducted with the help of statistical software (STATA). We use four different regression models including regular ordinary least squares (OLS), random-effects, and logit models. We work with an unbalanced panel<sup>9</sup> data set comprising 204 companies over the period 2000 through 2006.

In order to select an appropriate panel data model, we ran a Hausman specification test with results presented in Appendix 6. Based on these results, we conclude that the use of a random effects model can be justified in our specific case. The random effects model is based on the assumption that there is a firm specific effect in the unobserved error term in addition to the regular error term. The model requires that the firm specific effect is uncorrelated with the explanatory variables for each company. Normality tests have not revealed any significant deviations from assumed normality in the underlying variables. The concerns related to the correlation between independent variables have been partially dealt with by selective use of variables in our models. Potential concerns with heteroscedasticity and within-panel serial correlation have been addressed by specifying robust standard errors.

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<sup>9</sup> The unbalance comes from the fact that some firms have data for less than 6 years.

Our main test regression model is specified as following:

$$\begin{aligned}
\text{LONGCOMP\_YLY} = & \beta_0 \\
& + \beta_4 \text{OWN}_{it} \\
& + \beta_1 \text{SIZE\_MCAP}_{it} \\
& + \beta_3 \text{GROWTH}_{it} \\
& + \beta_2 \text{NEWS}_{it} \\
& + \beta_5 \text{CF\_MV}_{it-1} \\
& + \beta_6 \text{AGE}_{it} \\
& + V_{it}
\end{aligned}$$

Where  $V_{it}$  is the “composite” error term defined as:  $V_{it} = a_i + u_{it}$  and  $a_i$  is the firm-specific error term while  $u_{it}$  is the regular residual error term

## 7. Results

### *7.1 What Determines the Relative Size of Equity-Based Compensation?*

We use regression analysis based on pooled OLS and random effects models to establish the relationship between the relative size of equity-based compensation and a range of firm and CEO characteristics. With regards to the individual variables used in the regression analysis, Table 1 provides per-year averages for each variable. Our sample includes six years and over 190 observations per year. With regards to the share of long-term compensation in the total remuneration of company CEO's no trend can be easily distinguished, though 2005 appears to stand out as the year when the proportion of equity-based compensation was at its peak. It could probably be related to an apparent dip in the issue of long-term compensation in 2004 which was offset by a higher share of equity-based remuneration the year after. The CEO ownership appears to decrease slightly with time. Market capitalization and market-to-book multiples have been steadily increasing since 2003 and 2002 respectively, the years of slack economic growth. No distinct trend can be observed with regards to cash flow apart from a general improvement in the cash flow generation in 2005-2006 compared to cash outflows in

the preceding period reflecting more favorable economic conditions. The average age of company CEOs has been slightly increasing while remaining in the range of 48 to 50 years old.

**Table 1.** Average values for each variable in the data sample.

Year	Obs	LONGCOMP	OWN	SIZE_MCAP	GROWTH	NEWS	CF_MV	AGE
2001	190	0.0665	0.0485	7.4054	2.5903	106.6632	-0.0198	48.6
2002	196	0.0505	0.0467	7.1765	1.6729	102.1582	-0.1517	48.6
2003	199	0.0727	0.0409	6.8093	2.5223	127.9497	0.0022	49.1
2004	197	0.0396	0.0379	7.1696	2.7109	118.6802	-0.0093	49.3
2005	198	0.0858	0.0363	7.4651	3.1505	120.9747	0.0180	49.4
2006	196	0.0705	0.0383	7.7812	3.8081	133.8010	0.0124	49.8

In our pooled data model (Table 2), coefficients are significant for the size, age, news and growth variables. Our random effects model renders similar results for all variables but the visibility proxy<sup>10</sup>. Contrary to our expectations, in this model the news variable does not appear to have a statistically significant effect on the equity-based part of compensation, but the sign of the relationship is in line with our hypothesis, assuming that the more visible the company is, the higher is the fraction of equity-based compensation in the total compensation package. All variables except cash flows show signs in line with our expectations. More specifically, with regards to the size variable, the interpretation would be that when size increases by one unit, holding all other variables constant, the value of equity-based long-term payment as a fraction of total compensation increases on average by 0.015 and 0.014 percent respectively for the pooled and random effects models. Correspondingly, when the age of a CEO increases by one year, the part of long-term compensation as a fraction of total compensation decreases on average by 0.004 and 0.003 percent respectively.

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<sup>10</sup> The results of the regression where interaction between growth and news variables is considered are presented in Appendix 2. The interaction variable does not add explanatory value. This relation assumes that the co-existence of growth potential and visibility affects the extension to which equity-based payments are used as part of the overall compensation package. The assumption implies that visibility and growth potential separately cannot accurately explain their respective affect on the equity-based compensation usage. Instead, in addition to their stand-alone contributions, they also generate an interactive effect on the dependent variable, which should be included as a separate explanatory variable in mitigating specification error and omitted variables biases.



**Table 2.** Pooled Ordinary Least Squares regression for testing determinants of equity-based compensation. The data includes pooled data over the sample period. The dependent variable is the fraction equity-based compensation of total compensation.

Variable	Coefficient (Robust Standard Error)
OWN	-0.0260148 (0.0316969)
SIZE_MCAP	0.0153589*** (0.0029783)
GROWTH	0.0032468* (0.0018549)
NEWS	0.0000431* (0.0000267)
CF_MV	0.0043940 (0.0061364)
AGE	-0.0036302*** (0.0007600)
Industry dummies	Yes
Year dummies	Yes
Observations	1176
R-square	0.0985

\*significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 3.** Random effects regression for testing determinants of long-term compensation program. The panel data includes all firms for each year. The dependent variable is long-term payment as a fraction of total compensation package.

Variable	Coefficient (Robust Standard Error)
OWN	-0.0553923 (0.0488249)
SIZE_MCAP	0.0141283*** (0.0042588)
GROWTH	0.0029363* (0.0015643)
NEWS	0.0000464 (0.0000495)
CF_MV	0.0060304 (0.0067009)
AGE	-0.0033925*** (0.0009139)
Industry dummies	yes
Year dummies	yes
Observations	1176
Groups	204

\*significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

The logic behind the unexpected sign of the cash flow variable may give an indication of cash flows being more tied to agency problems (see Jensen and Meckling, 1976) rather than concerns of conserving cash balances. In other words, a firm with a large cash account may face the risk of moral hazard in that the CEO with access to excess amounts of cash may take the opportunity to use the money for personal purposes or other non-value adding activities within the company, rather than for optimal firm investments. Therefore, higher cash flow volumes appear to be positively related to the size of the equity-based compensation.

The ownership variable is not observed to have a statistically significant effect on the long-term compensation, though the sign of the relationship is congruent with our predictions. The higher is the ownership the less is the fraction of equity-based compensation. None of our industry- and year dummies are observed to have any statistically significant effects on the independent variable which gives an indication that there are no time or industry average-related aberrations when it comes to the structure of compensation package.

In terms of possible biases, the use of a pooled data model suggests that the biases may arise due to the fact that firms do not grant equity-based rewards every year. This drawback is however mitigated when using the panel model. Regardless, the pooled tests produce results very much similar to the ones obtained with the panel data model.

We run another random effects test applied to a restricted dataset including only firms registered on the large-cap OMX list where the number of stock listings serves as a proxy for visibility (see Appendix 3). The number of listings appears to have no statistically significant effect on the fraction of long-term compensation, however the sign of the relationship is congruent with our expectations. In other words, as the number of foreign listings increases this contributes to the rising visibility of the company and its CEO creating a wider range of alternative employment opportunities which in its turn explains a need for long-term incentives as a counter-balance to short-terministic incentives created by the market. Another result that should be mentioned is a high significance of CEO's current ownership in the company in determining the relative weight of long-term compensation in the total remuneration package. It supports our general hypothesis, but poses a question why this relationship is less strong for the total sample.

## 7.2 What Firm and CEO Characteristics Increase the Probability of Having an Equity-Based Compensation?

Apart from examining the determinants of the relative size of equity-based compensation we are also keen on uncovering the relative probability of encountering long-term compensation in a specific firm given a set of company characteristics. An appropriate tool for determining factors that increase the probability of introducing long-term remuneration is a logit model. We omit the detailed discussion of the technicalities of the logit model as it lies outside the scope of this paper, while the basic logic behind the model is described in Appendix 5.

Using logit we regress the long-term compensation indicator (1 for equity-based compensation being used by a company) on controls for firm and CEO characteristics. We include industry and year dummies in the regression for in line with the methodology introduced by Malmendier and Tate (2007). The goal here is to determine the differential probability of having a long-term compensation program given certain CEO and company characteristics. The results presented in Table 4 suggest that as a group all independent variables have a significant impact on the probability of encountering a long-term compensation as a part of total remuneration<sup>11</sup>.

**Table 4.** Logit regression determining the availability of long-term compensation program. The panel data includes all firms for each year. The dependent variable is a dummy variable equal to 1 if the long-term compensation program was introduced any year over the sampled period. Coefficients are displayed as odds ratios.

Variable	Odds Ratio (Robust Standard Error)
NEWS	1.00076** (0.0003841)
AGE	0.935602*** (0.009585)
GROWTH	1.088966** (0.0409831)
OWN	0.0012184*** (0.0015509)
CF_MV	1.138653 (0.2189666)
SIZE_MCAP	1.025501 (0.046917)
Industry dummies	Yes
Year dummies	Yes
Observations	1176
Pseudo R-square	0.1657

\*significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%

<sup>11</sup> The LR statistic is following the  $\chi^2$  distribution with a p value equal to 0.0000.

The results of the estimation suggest that CEO's age, company visibility, and company growth potential along with CEO's ownership in the company have a significant impact on determining the probability of a long-term compensation program being introduced by a firm. More specifically the results can be interpreted in the following way. If CEO's age, controlling for all other factors, increases by one year the odds ratio will decrease by 8 percent. In other words a company with a CEO who is one year older than his counterpart in an identical peer company is 8 percent less likely to choose a stock option program as a part of CEO's remuneration.

The most influential factor among the regressors is represented by the CEO's current ownership in the company. The logic behind this dependence is quite intuitive. Once the interests of the shareholders and senior management are aligned through share ownership less rationale remains for introducing additional stock option programs. Besides, as discussed in the theoretical section, there are normally limits on the amount of shares that can be owned by the company CEO, and if the ceiling is reached formal restrictions prevent further issue of stock-option compensation. On top of that, the CEO herself may be unwilling to be reimbursed in long-term remuneration when she already owns a significant block of shares. Since a CEO is normally involved in shaping the format of her compensation package such considerations should have an effect on the terms of the compensation.

Another factor influencing the differential probability of having a long-term compensation program for CEO is the growth potential, for which we use a market-to-book ratio as a proxy. This result is congruent with the model where higher growth prospects are predicted to be positively related to a higher share of long-term compensation in the total CEO compensation (Giannetti, 2007). While growth prospects as such do not determine the share of long-term compensation as suggested by the results on regressions in the previous section, growth appears to have a statistically significant effect on determining whether the long-term compensation in the first place will be considered by a firm as one of the compensation options.

It should be pointed out that in the logit estimation, the news variable, a proxy for visibility, does appear to have a statistically significant impact on the odds of encountering a long-term compensation in the total remuneration package, which supports our hypothesis that a higher visibility is positively related to a higher share of compensation being represented by long-term incentives in order to align CEO interests with those of company shareholders. The odds increase slightly as the number of news articles, i.e. visibility, increases.

## 8. Conclusions

The goal of this paper was to investigate explanatory factors behind the use of long-term equity-based compensation by Swedish stock listed companies. Applying quantitative analysis we have arrived at the following conclusions with regards to our earlier presented hypothesis.

We obtained mixed results regarding the positive relationship between the fraction of equity-based compensation and firm visibility. While the sign of the relationship is always positive providing the evidence in support of our original hypothesis, only in two out of three main tests, namely pooled OLS and logit model regressions the relationship has a statistical significance. However, the failure to establish a statistically significant relationship in the panel data model may also depend on the failure of our proxies to capture the visibility effect. This calls for further investigation of the underlying problematics based on the use of more sensitive analysis and more adequate proxies.

The hypothesis that larger firms are more likely to use a higher fraction of equity-based compensation has been supported by the results from all three major tests. The result was reported in previous studies and was in line with our expectations.

Some evidence has been obtained in favour of the hypothesis that firms with higher growth prospects use a higher fraction of equity-based compensation. These findings are in line with the previous research and reflect an effort to combat agency problems and finance present investment needs by shifting incentive horizon into the future. The evidence has also been found in support of our expectation that older CEOs would be more interested in reducing the fraction of equity-based compensation in their total package due to their limited age span and clear preference for short-term remuneration.

With regards to the hypothesis that firms with low cash flow tend to use more equity-based compensation, no evidence supporting this statement has been found. The level of cash flow does not appear to determine the relative size of the long-term compensation.

No statistically significant relationship has been found between the CEO ownership in the company and the fraction of long-term compensation, though the relationship appears to be negative in all test conducted. However, the size of the ownership appears to have a determining effect on the probability of introducing equity-based rewards versus adhering to short-term rewards as demonstrated by the results of the logit test model.

We find evidence in favour of our more general hypothesis that addresses the dichotomy of equity-based versus short-term compensation. In line with our expectations the results of our tests suggest that the odds of administering equity-based compensation as a part of a total CEO compensation package increase with rising firm visibility and growth opportunities. On the other hand, the odds drop as CEOs age and ownership goes up.

These findings prompt us to believe that even though visibility and other company characteristics are important in explaining the probability of encountering equity-based compensation as part of remuneration, the variations in those factors are not sufficient enough to explain its relative size. It is likely that there exist a range of hidden or random factors which are not captured by the independent variables suggested in the present analysis. In this context some suggestions for further research would include the expansion of the set of explanatory variables through possibly including data on shares bid-ask spread, trade volumes, CEO tenure and education, etc. Hopefully, this would allow to better capture the variation in the relative size of the equity-based compensation. In general, improved visibility proxies can allow for more accurate conclusions on the relationship between company visibility and the fraction of equity-based compensation in the total remuneration package.

## 9. References

- Baker, H. K., J. R Nofsinger, and D. G. Weaver (2002). "International cross-listing and visibility", *Journal of Financial and Quantitative Analysis* 37, 495-521.
- Bebchuk, L. and Y. Grinstein (2005). "The Growth of Executive Pay", NBER Working Papers 11443, National Bureau of Economic Research, Inc.
- Black, F., and M. Scholes (1973). "The Pricing of Options and Corporate Liabilities", *Journal of Political Economy* 81 (3): 637-654.
- Bryan, S., Nash, R., and A. Patel (2006). "The Structure of Executive Compensation: International Evidence from 1996-2004", Working Paper Series, SSRN.
- Forbes, A., de Porbaix, B. (2007). "CEO compensation: the influence of foreign and institutional investors", Master thesis at SSE, Stockholm.
- Frydman, C. (2005). "Rising Through the Ranks: The Evolution of the Market Corporate Executives, 1936-2003", Working Paper Series, MIT Sloan School of Management
- Giannetti, M. (2007). "Serial CEO Incentives and the Structure of Managerial Contracts", ECGI - Finance Working Paper No. 183/2007
- Hartzell, J.C. and L.T. Starks (2003). "Institutional Investors and Executive Compensation", *The Journal of Finance* 58(6): 2351-2374(24).
- Harvey, K.D. and R.E. Shrieves (2001). "Executive Compensation Structure and Corporate Governance Choices", *Journal of Financial Research* 24(4): 495-512.
- Himmelberg, C. and G. Hubbard (2000). "Incentive Pay and the Market for CEOs: An Analysis of Pay-for-Performance Sensitivity", Presented at Tuck-JFE Contemporary Corporate Governance Conference.
- Jensen, M.C and W.H. Meckling (1976). "Theory of the firm: Managerial Behaviour, Agency Costs and Ownership Structure", *Journal of Financial Economics* 3, 305-360.
- Jensen, M.C. and K.J. Murphy (1990). Performance Pay and Top Management Incentives, *Journal of Political Economy* 98(2).

Malandier, U. and G.Tate (2007). “Superstar CEOs”, Working Paper Series, SSRN.

Merton, R.C. (1973). “Theory of Rational Option Pricing, Bell Journal of Economics and Management Science”, *The Bell Journal of Economics and Management Science* 4(1): 141-183.

Murphy, Kevin J. (1999). “Executive Compensation.” in *Handbook of Labor Economics*. Orley Ashenfelter and David Card, eds. Amsterdam: North Holland, pp. 2485-2563.

Rajgopal, S., Shevlin, T., and V.Zamora (2006). “CEOs’ Outside Employment Opportunities and the Lack of Relative Performance Evaluation in Compensation Contracts”, *The Journal of Finance* 61(4): 1813-1844.

Rayton, Bruce A., Brammer, S., and S.Cheng (2007). “The Effects of Corporate Visibility on Executive Pay: a Test of the Implicit Regulation Hypothesis”. Work in progress.

Schaefer, S. (1998 ). “The Dependence of Pay-Performance Sensitivity on the Size of the Firm”, *The Review of Economics and Statistics* 80(3): 436-443

Stern Business, NYU Research, Fall/Winter 2006, Vol. 3 No. 1:

<<http://www.nyu.edu/nyutoday/archives/20/04R/PageOneStories/Stern-CEO.html>>

SVT Rapport news channel (August 24, 2007), “A study by Folksam”



# Appendix 1

**Table 1 A.**

Correlation between independent variables

	OWN	LIST	SIZE_MCAP	GROWTH	NEWS	CF_MV	AGE
OWN	1.0000						
LIST	-0.0686	1.0000					
SIZE_MCAP	-0.1846	0.3471	1.0000				
GROWTH	-0.0292	0.1577	0.0933	1.0000			
NEWS	-0.1250	0.3574	0.5704	0.0585	1.0000		
CF_MV	0.0240	0.0549	0.0918	0.0323	0.0249	1.0000	
AGE	0.1984	0.1202	0.2412	0.0416	0.1549	0.0326	1.0000

**Table 1 B.**

Industry codes for the sample firms.

Industry Codes:
1 = finance
2 = health care
3 = industrial
4 = information technology
5 = consumer goods
6 = media and entertainment
7 = commodities
8 = telecommunications
9 = service

## Appendix 2

**Table 2 A.**

Pooled Ordinary Least Squares regression for testing determinants of equity-based compensation. The data includes pooled data over the sample period. The dependent variable is the fraction equity-based compensation of total compensation. *Interaction variable included.*

Variable	Coefficient (Robust Standard Error)
OWN	-0. 0279884 (0. 031706)
SIZE_MCAP	0. 0159326 *** (0. 0029725)
GROWTH	0. 0018892 (0. 0021805)
NEWS	-8. 22e-06 (0. 0000396)
CF_MV	0. 0044369 (0. 0061602)
AGE	-0. 003591 *** (0. 0007604)
GROWTH_NEWS	0.000013 (0.000011)
Industry dummies	Yes
Year dummies	Yes
Observations	1176
R-square	0.1004

Standard errors robust to heteroscedasticity and cross-sectional correlation are in parentheses. We included industry- and year dummies in our models but do not report coefficient values.

\*significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 2 B.**

Random effects regression for testing determinants of long-term compensation program. The panel data includes all firms for each year. The dependent variable is long-term payment as a fraction of total compensation package. *Interaction variable included.*

Variable	Coefficient (Robust Standard Error)
OWN	-0. 0551475 (0. 0486877)
SIZE_MCAP	0. 0142568 *** (0. 0041839)
GROWTH	0. 0025559 (0. 0018463)
NEWS	0.000032 (0. 000037)
CF_MV	0. 0060189 (0. 0066874)
AGE	-0. 0033857 *** (0. 0009093)
GROWTH_NEWS	3. 74e-06 (9. 24e-06)
Industry dummies	Yes
Year dummies	Yes
Observations	1176
Groups	204

Standard errors robust to cross-sectional heteroscedasticity and within-panel serial correlation are in parentheses. We included industry- and year dummies in our models but do not report coefficient values.

\*significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

## Appendix 3

**Table 3.**

Random effects regression for testing determinants of long-term compensation program. The panel data is restricted to large-cap firms exclusively for each year. The dependent variable is the long-term payment as a fraction of total compensation package. *Restricted dataset with LIST variable as visibility proxy*

Variable	Coefficient (Robust Standard Error)
OWN	-0.323353*** (0. 1663646)
LIST	0.00272 (0. 0143411)
SIZE_MCAP	0.03081*** (0. 0118592)
GROWTH	0.003746 (0. 008217)
CF_MV	0.012123 (0. 0743989)
AGE	-0.000846 (0. 0017929)
Industry dummies	Yes
Year dummies	Yes
Observations	337
Groups	58

Standard errors robust to cross-sectional heteroscedasticity and within-panel serial correlation are in parentheses. We included industry- and year dummies in our models but do not report coefficient values.

\*significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

## Appendix 4

### *Logit Model*

The logit model evaluates the probability of certain events of interest taking place. Hence, it measures the affect of company characteristics on the probability of using long-term equity-based compensation. These models deal with odds. The most general formula for the model is as follows:

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = Z_i = \beta_1 + \beta_2 X_i$$

Where  $L_i$  is the log of the odds ratio  $P/(1-P)$ , or the ratio of the probability that the event of interest takes place versus that it does not take place, and  $L_i$  is conventionally called the logit. If  $L_i$  is positive, it means that when the value of the regressors increase, the odds that he regressand equals 1 (in our case, it would imply the probability of a company having an option program) increases and vice versa when it comes to the negative value of  $L_i$ .

Another suitable model for dealing with the odds would be a probit model, but seems both models render similar results when applied to ungrouped/individual data as the case is with our dataset, and there are no obvious reasons to prefer one model to another, logit is normally selected for its comparative mathematical simplicity and more straightforward result interpretation.

## Appendix 5

### *Black and Scholes Stock Option Valuation*

Valuing the option grants each year, we relied upon the traditional Black and Scholes option valuation formula (Black, Scholes, 1973). The model has been subject to several areas of critique due to its simplifying underlying assumptions (e.g. no taxes or transaction costs, no dividends, no arbitrage opportunities and no exercise before maturity). Several scholars have expanded the model in relaxing some of the restrictions. The expansion applied in our study is the model developed by Merton (1973) where the restriction of no dividends is removed and instead incorporates a continuous dividend yield.

Formula

$$c(S_0, T) = e^{-rt} (S_0 e^{(r-q)T} \cdot N(d_1) - KN(d_2))$$
$$d_1 = \frac{\ln(S_0 e^{(r-q)T} / K) + (\sigma^2 / 2)T}{\sigma \sqrt{T}} \quad d_2 = d_1 - \sigma \sqrt{T}$$

Where  $c$  is the call option price determined by:

1.  $r$  is the estimated risk-free interest rate over the lifetime of the option. The estimation values used for this variable are the Swedish Riksbank's rates on T-bills and Treasury bonds.
2.  $S^0$  is the stock-price at the time of issue. The data was collected from SIXTRUST database.
3.  $q$  is the estimated continuous dividend yield. Most company reports provide data on the dividend yield. However, as dividend yields often differ over time we used a proxy rate of 3%.
4.  $K$  is the strike price of the option. Information on the strike prices was taken from company annual reports.
5.  $\sigma^2$  is the estimated volatility of the underlying stock. The data was gathered using the SIXTRUST database.
6.  $T$  is the time to maturity of the option for which information was found in company annual reports. For some of the companies for which information was unavailable, we used an estimation of 5 years.

## Appendix 6

**Table 6.**

Hausman test for selection between fixed and random effect regressions

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	S.E.
-----+-----				
OWN	-.1269126	-.0607225	-.0661901	.069476
SIZE_MCAP	.009962	.0130085	-.0030465	.0054304
GROWTH	.0034171	.0036995	-.0002824	.0009303
NEWS	.0000524	.0000374	.000015	.0000462
CF_MV	.0088408	.0090327	-.0001919	.0025639
AGE	-.0032948	-.0030221	-.0002727	.0007543
-----				
b = consistent under Ho and Ha; obtained from xtreg				
B = inconsistent under Ha, efficient under Ho; obtained from xtreg				
Test: Ho: difference in coefficients not systematic				
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)				
= 1.98				
Prob>chi2 = 0.9214				